UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/028,432 | 12/28/2001 | Myoung Goo Lee | 0630-1290P | 4397 |

2292 7590 03/24/2004

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

| EXAMINER | |
|---|---|
| LANDAU, MATTHEW C | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2815 | |

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/028,432 | LEE ET AL. | |
| | Examiner | Art Unit | |
| | Matthew Landau | 2815 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *15 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,5-9,11,14-18 and 21-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *28-30* is/are allowed.

6)☒ Claim(s) *1,5,7-9,11,15-18,21-23,25-27,31 and 32* is/are rejected.

7)☒ Claim(s) *6,14 and 24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 11, 18, 27 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al. (US Pat. 6,323,523, hereinafter Lee).

In regards to claim 1, Figure 3A of Lee discloses a multi-finger type ESD protection device comprising: a semiconductor substrate; a plurality of first active regions (201B/202A/201A and 101A/102A/101B) formed separately on the semiconductor substrate; a plurality of gates (200 and 105) formed in each of the first active regions; and a single predetermined conductive type second active region 124 (left one) formed between two of the first active regions, wherein the predetermined conductive type second active region includes an n+ junction connected to Vcc reference voltage, and is without a gate, a source and a drain; and a third active region (110A/110C) surrounding the first and second active regions and being of conductivity type different from that of the first active regions.

In regards to claim 11, Figure 3A of Lee discloses a multi-finger type ESD protection device comprising: a semiconductor substrate; a plurality of first active regions (201B/202A/201A and 101A/102A/101B) formed separately on the semiconductor substrate; a plurality of gates (200 and 105) formed in each of the first active regions; and a single predetermined conductive type second active region 124 (left one) formed between two of the

first active regions, wherein the predetermined conductive type second active region includes an n+ junction connected to Vcc reference voltage, and is without a gate, a source and a drain.

In regards to claims 18, Figure 3A of Lee discloses a multi-finger type ESD protection device comprising: a semiconductor substrate; a plurality of first active regions (201B/202A/201A and 101A/102A/101B) formed separately on the semiconductor substrate; a plurality of gates (200 and 105) formed in each of the first active regions; and a single predetermined conductive type second active region 110B formed between two of the first active regions, wherein the predetermined conductive type second active region includes an p+ junction connected to ground Vss, and is without a gate, a source and a drain.

In regards to claim 27, Figure 3A of Lee discloses spaces are provided between the first and second active regions.

In regards to claim 31, Figure 3A of Lee discloses a multi-finger type ESD protection device comprising: a semiconductor substrate; a plurality of first active regions (201B/202A/201A and 101A/102A/101B) formed separately on the semiconductor substrate; a plurality of gates (200 and 105) formed in each of the first active regions; and a single predetermined conductive type second active region 110B formed between two of the first active regions, wherein the predetermined conductive type second active region includes an p+ junction connected to ground Vss; and a third active region (110A/110C) surrounding the first and second active regions and being of conductivity type different from that of the first active regions, wherein spaces are provided between the first and second active regions.

Claims 11, 15, 16, 18, and 25-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim.

In regards to claim 11, Figures 2 and 3 of Kim disclose a multi-finger type ESD protection device comprising: a semiconductor substrate; a plurality of first active regions (36'/34/36 and 56'/54/56) formed separately on the semiconductor substrate; a plurality of gates (38 and 58) formed in each of the first active regions; and at least one predetermined conductive type second active region 64 formed between two of the first active regions, wherein the predetermined conductive type second active region includes an n+ junction connected to Vcc, reference voltage, and is without a gate, a source and a drain.

In regards to claim 15, Figure 2 of Kim discloses source regions 54/34 each formed between two gates in each of the first active regions.

In regards to claim 16, Figure 2 of Kim discloses the first and second active regions and the gates extend substantially parallel to each other and have a substantially same shape.

In regards to claim 18, Figures 2 and 3 of Kim disclose a multi-finger type ESD protection device comprising: a semiconductor substrate; a plurality of first active regions (36'/34/36 and 56'/54/56) formed separately on the semiconductor substrate; a plurality of gates (38 and 58) formed in each of the first active regions; and at least one predetermined conductive type second active region 44 formed between two of the first active regions, wherein the predetermined conductive type second active region includes an p+ junction connected to ground Vss, and is without a gate, a source and a drain.

In regards to claim 25, Figure 2 of Kim discloses source regions 34/54 formed between the gates in each of the first active regions.

In regards to claim 26, Figure 2 of Kim discloses the first and second active regions and the gates extend substantially parallel to each other and have substantially same shape.

In regards to claim 27, Figures 2 and 3 of Kim disclose spaces are provided between the first and second active regions.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 5, 7-9, 18, 21-23, 25-27, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukude in view of Ito and Lin.

In regards to claims 1, 18, 23, 27, and 31, Figure 8 of Tsukude discloses a multi-finger type ESD protection device comprising: a semiconductor substrate; a plurality of first active regions (2a/2b/2c) formed separately on the semiconductor substrate; a plurality of gates (3a/3b) formed in each of the first active regions; and a single predetermined conductive type second active region 16e formed between two of the first active regions, wherein the predetermined conductive type second active region is without a gate, a source and a drain; and wherein spaces are provided between the first and second active regions. A difference between Tsukude and the claimed invention is the second active region includes a p+ junction connected to ground Vss. Tsukude discloses a p-type substrate with n-type active regions, wherein the second active region includes an n+ junction connected to ground Vss (column 9, lines 63-67). Figure 2 of Ito

discloses P-type MOS transistor with an n-type substrate and p-type active regions. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Tsukude by reversing the conductivity types of the substrate and active regions, thereby obtaining a second active region with a p+ junction connected to ground Vss. The ordinary artisan would have been motivated to modify Tsukude in the manner described above since n-type and p-type devices are art-recognized equivalents. A further difference between Tsukude and the claimed invention is a third active region surrounding the first and second active regions and being of conductivity type different from that of the first active regions. Figure 1 of Lin discloses a p+ guard ring (third active region) surrounding a multi-fingered MOSFET, wherein the guard ring has a conductivity type different than that of an active region which it surrounds (column 5, lines 10-15). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Tsukude by including the guard ring (third active region) of Lin for the purpose of preventing latchup.

In regards to claim 5, Figure 8 of Tsukude discloses a plurality of drain regions (2a/2c) formed in each of the first active regions.

In regards to claims 7 and 25, Figure 8 of Tsukude discloses a plurality of source regions 2b each formed between a pair of gates in each of the first active regions.

In regards to claims 8, 9, and 26, Figure 8 of Tsukude discloses the first and second active regions and the gates extend substantially parallel to each other and have a substantially same shape.

In regards to claims 21, 22, and 32, it is further obvious in the invention of Tsukude in view of Ito and Lin to use the guard ring (third active region) of Lin, which completely surrounds the first and second active regions (see Figure 1), for the purpose of improving protection against latchup.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Lin.

In regards to claim 17, Figure 3A of Lee discloses a third active region (110A/110C) surround the first and second active regions. The difference between Lee and the claimed invention is the third active region surrounding completely the first and second active regions. Figure 1 of Lin discloses a guard ring (third active region) completely surrounding another active region. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Lee by using the guard ring of Lin for the purpose of improving protection against latchup.

***Allowable Subject Matter***

Claims 28-30 are allowed.

Claims 6, 14, and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### *Response to Arguments*

Applicant's arguments filed December 15, 2003 have been fully considered but they are not persuasive.

In response to Applicant's arguments regarding Lee and Kim that the references do not disclose a single second active region between the two first active regions, both Lee and Kim do disclose a single active region as noted in the above rejection. It is acknowledged that Lee and Kim disclose multiple active regions between the two first active regions. However, the examiner indicates that only one of these active regions is considered to be the second active region. Therefore, Lee and Kim still disclose "a single second active region". There is nothing in the claim language that would exclude this interpretation.

Applicant's arguments regarding Tsukude in view of Ito that the modification suggested by the examiner "is not obvious since the application of different voltage to each of the impurity regions would also need to be considered and modified to render the overall device operative" is not persuasive. If any voltage changes were necessary, they would certainly be obvious to one of ordinary skill in the art. Furthermore, the only voltage connection claimed is the ground, which would not be affected by a change in conductivity type.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JEROME JACKSON
PRIMARY EXAMINER

Matthew C. Landau

Examiner

March 12, 2004